V. TECHNICAL ASPECTS

FORCED CHOICE TECHNIQUE

Items in the inventory have been presented in form of pairs and the respondents are required to choose one of the two alternative acitivities grouped under an item. It, thus, employes forced-choice technique for presentation of items. The forced-choice technique has been preferred because, as Edward points out, it reduces the effect of 'social desirability', it reduces bias, and the validity under the forced-choice technique is stable over a period of item. The time honoured 'L.I.D.' technique is not easy to handle effectively as the decision making required under it is subject to ambiguity and prone to response set.

ITEM ANALYSIS

The experimental draft of the inventory had 462 items, put in form of 231 pairs. 66 items under each of the seven interest categories enumerated above were collected and went to form a pool of 462 itmes. While forming pairs care was taken that an item under any one interest category was paired equal number of times with an item under any one of the remaining six interest categories. With seven interest categories 21 types of pairs —7 (C) (2) — were formed. Each of the 21 pairs occurred 11 times in the inventory as the experimental draft contained 231 pairs. To form pairs, two types of information: (1) social desirability index and (2) discriminative index, were desired about each of the 462 items. Two items could not be put together to form a pair if the soical desirability indices of both the items were not approximately equal. Each item was got rated on a five point scale by a sample of 164 students of class X comprising of all the six courses of study to arrive at the social desirability indices for each of the 462 items. The five point ratings of individual items were transformed with the application of the method of Successive Categories to give a numerical value. The numerical value, thus obtained, indicated the social desirability index of the item.

The item analysis was performed on a data obtained by administering the experimental draft of the inventory with 231 pairs on a group of 244 students reading in class X and falling under all the six courses of study. The performances of upper and lower 27% of the sample forming the two contrasting groups — the high and the low scoring groups were compared separately on all the seven interest categories. It yielded discriminating indices for all the 462 items.

The critical value below which an item was rejected was taken to be 11, as per computing tables. After eliminating items whose critical value was less than 11, 48 items under each of the seven interest categories were found satisfactory. 336 items (48 × 7) possessing more than the minimum discriminating power were taken, in the final analysis, to form the final draft of the inventory.

The final draft of the inventory, thus, had 168 pairs of items. Each of the 21 types of pairs occurs 8 times in the inventory.

SAMPLE

1436 students of class X reading in 35 higher secondary schools of Uttar Pradesh formed the sample for the present study. The institutions included in the sample were spread over the whole of the State of U.P. except its hilly region and offered courses in at least four out of the six streams of higher secondary education. Thus a student entering the institution had before him a sufficient number of courses to choose an educational course from according to his abilities, aptitudes and personality qualities. In a way, the satisfaction of this criterion permits the element of interest in the student to operate.

INTERCORRELATIONS

Intercorrelation of the scores of 1436 male students is shown in Table below (Decimal points have been omitted) :

Table 11 : Intercorrelations of Interest Record Factors
(N = 1436)

	A	*B*	*C*	*D*	*E*	*F*	*G*
A – Mechanical		– 209	198	253	– 424	– 252	– 093
B – Business			– 513	147	032	409	– 169
C – Scientific				– 428	– 183	– 384	– 125
D – Aesthetic					– 089	– 216	– 045
E – Social						019	– 059
F – Clerical							– 301
G – Outdoor							– –

RELIABILITY

100 scripts, out of the total lot of 1436 referred to above, were randomly selected to work out reliability coefficients. The split half coefficients corrected by Spearman Brown Formula for different interest factors are set out in Table 12.

Table 12 : Reliabilities of Interest Factors

	Interest Factor	‘*r*’
A	Mechanical	.85
B	Business	.70
C	Scientific	.77
D	Aesthetic	.84
E	Social	.75
F	Clerical	.77
G	Outdoor	.72

VALIDITY

The interest record has a reasonably good construct and content validity. The bed rock of the construction of the record are seven interest factors reported by Guilford and his associates and is an evidence of the 'construct' underlying it. Content validity of the record is estabilshed deductively from the item analysis data and intercorrelations of interest factors reported above.

The empirical validity of the Interest Record will be established in courses of time when it is used more and more by guidance and counselling agencies.

NORM GROUP STATISTICS

Means and standard deviations of the entire tenth class (general) and its three streams : Scientific, Constructive and Aesthetic are given in Table 13. The courses of study included in the scientific stream are physical and biological sciences: the constructive stream includes wood-craft, metal craft, spinning, weaving and such other non-academic practical subjects; music; painting; sculpture and drawing are included in the aesthetic stream.

Table 13 : Means and Standard Deviations for Different Streams of Class X of U.P.

(1, 2, 3 and 4 stand for the general, scientific, constructive and aesthetic streams respectively)

Interest Factor	*Stream Means*		*S.D.*	*S.E.*
A. Mechanical	(1)	24.7	9.0	.46
	(2)	28.6	8.5	.96
	(3)	33.6	7.5	.96
	(4)	16.9	6.5	.98
B. Business	(1)	18.8	6.5	.33
	(2)	14.6	4.5	.51
	(3)	16.0	5.0	.64
	(4)	16.9	5.5	.83
C. Scientific	(1)	30.5	8.5	.43
	(2)	36.7	6.0	.68
	(3)	30.0	8.1	1.04
	(4)	24.7	7.5	1.14
D. Aesthetic	(1)	19.7	8.0	.41
	(2)	19.7	7.6	.80
	(3)	17.6	5.0	.64
	(4)	35.2	6.0	.91
E. Social	(1)	28.9	7.0	.35
	(2)	26.8	7.5	.85
	(3)	26.7	7.4	.95
	(4)	32.9	5.5	.83
F. Clerical	(1)	18.0	7.0	.35
	(2)	15.6	4.9	.56
	(3)	16.8	5.5	.70
	(4)	14.6	4.2	.63
G. Outdoor	(1)	27.2	6.0	.30
	(2)	26.5	5.5	.62
	(3)	28.0	7.0	.90
	(4)	26.8	4.7	.71

VI. USE OF CONFIDENCE BANDS IN INTERPRETATION

(BY DR. ATMANANDA SHARMA, DEAN (RESEARCH), NCERT)

All scientists, whether they belong to physical sciences, biological sciences or behavioural sciences agree that no measurement is exact or perfect; all measurements involve some error. In psychological measurement, errors may be due to unreliability of the test (content); unstability overtime (of the testee); or unreliability in scoring and administration (tester unreliability). Therefore, the obtained score is only an estimate of the true measure, and as such can never be a fixed point. It tends to range between certain limits. The range of confidence and its length is called **'Confidence Band'.** As a convention, in psychological measurement, **range which includes 68% measures is taken as the range of confidence and its length is called Confidence Band'.**

LENGTH OF CONFIDENCE BAND

The length of confidence band (C) is two Standard Errors of Measurement (SEM);

$$C = S \pm \text{SEM},$$

where S stands for Score, be it raw score, standard score, T-Score, stanine grade, percentile rank or any other derived score.

In other words, the confidence band extends one SEM in each direction of the obtained score.

$$\text{SEM} = \text{s.d.}\ (1 - r_{tt}),$$

where s.d. stands for standard deviation of test scores.

r_{tt} stands for the reliability of the test.

For stanine grades, s.d. is approximately '2'

Therefore $\text{SEM} = 2\ (1 - r_{tt})$ (for Stanine Grades)

N.B. 1. Whether a confidence band is worked out from a raw score, stanine grade or percentile rank, its length and position on test profile will be the same.

N.B. 2. But each test will have a different confidence band depending upon its r_{tt}.

For the seven interest factors the length of the confidence bands for stanine grades will be as under :

Table 14 : S.E.M. and Confidence Bands of Interest Factors for Stanine Grades

Interest Factor	r_{tt}	*S.E.M.*	*Confidence Band*
A	.85	0.80	SG ± 0.80
B	.70	1.10	SG ± 1.10
C	.77	0.96	SG ± 0.96
D	.84	0.80	SG ± 0.80
E	.75	1.00	SG ± 1.00
F	.77	0.96	SG ± 0.96
G	.72	1.06	SG ± 1.06

To illustrate, if an individual's Stanine Grade in Factor E is V, then the confidence band is V ± 1.00 *i.e.*, Stanine VI to IV. His true score lies between Stanine VI and IV.

RULES FOR INTERPRETING BANDS

Rule 1. One is reasonably sure that the 'true' score of an individual lies somewhere within the percentile band.

Rule 2. When two percentile bands do not overlap, one may reasonably sure that there is real or significant difference.

Rule 3. When two percentile bands overlap there may not be any real or significant difference between two individuals in the mechanical aptitude.

APPLICATION OF THE RULE

The interest factor scores of three students: A, B and C are given in Table 15. These illustrate the three different types of interest patterns, High, above-average and 'flat' (or undifferentiated).

Table 15 : Interest Scores of Three Students

Interest Factors		*Student A*		*Student B*		*Student C*	
		R.S.	*Stanine*	*R.S.*	*Stanine*	*R.S.*	*Stanine*
Mechanical	(A)	8	I	34	VII	18	IV
Business	(B)	36	IX	6	I	19	V
Scientific	(C)	21	III	42	VIII	14	VI
Aesthetic	(D)	17	IV	32	VII	23	VI
Social Service	(E)	36	VII	18	II	30	V
Clerical	(F)	26	VIII	15	IV	20	VI
Outdoor	(G)	24	IV	21	III	24	IV
Total		168		168		168	

When the interest profiles are drawn as bands on graph paper, it will be seen :

For Student A

The bands of factors B, F and E overlap; there are no differences in these 'high' and 'above average' interest areas. Likewise the bands of factors C, D and G overlap; there are no differences in the 'low' interest areas.

'High' interest factors : B, F and E

'Low' interest factor : A

For Student B

The bands of factors C, A and D overlap; there are no differences in these 'above average' interest areas. Likewise the bands of factors F and G overlap and also of factors E and G; there are no differences in these 'low' interest factors.

'High' interest factors : Nil

'Above Average' interest factors : C, A and D

'Low' interest factors : B and E

For Student C

All the bands overlap, and are mainly of 'average' category. There are neither differences in his interest factors nor the interests are differentiated.

Student A

The "High" interest of this student lies in the area 'business' and there are no differences in this factor as well as 'social service' and 'clerical' whose bands overlap with that of 'business' factor. Thus this student will feel more satisfied in 'business-selling' and 'business-contact' activities. He may, therefore, like to explore occupations in the area business-clerical and business-social. Furthermore, he has little interest in 'mechanical' factor, he may not feel satisfied in 'business-mechanical' jobs. It is also noticed that he is 'below average' in scientific factor, and therefore may not feel satisfied in jobs falling under the area 'business-scientific' as well.

Student B

This student has no 'high' interest but has 'above average' interest in scientific, mechanical and aesthetic areas. Thus, he is likely to feel more satisfied in jobs which require "thinking and reasoning" abilities and which may also have to do with machines. Therefore, he can enter mechanical and engineering jobs, the level of which will be determined by the level of his intelligence. If his level of intelligence and scholastic attainments are not of a high order then he may do well to explore middle level jobs in the family of (Mechanical-scientific, Mechanical-aesthetic) jobs. Furthermore, he has 'no' interest in business-factor; he may not feel satisfied in mechanical-business, scientific-business.

Student C

This is a student who has no "high" or "above average" interests; also he has no 'low' and 'below average' interests. All his interests are of 'average' category — falling in stanine IV, V or VI. Thus his interest profile is "flat"; in other words his interests have not yet been differentiated. It is adviseable to provide him experiences in varied kinds of activities; this may help him to understand his likes and dislikes. There is also some possibility that the student has not yet attained the stage when the interests mature.

Another possibility is also there in such cases. The student might have filled the blank carelessly. In such cases verification through a case history data, information blank, or interview should be taken up and his interest pattern determined.

In case of 'flat' profile, therefore, the counsellor should try to ascertain the cause of 'flatness' or 'undifferentiated interest pattern'. In providing vocational guidance he (the counsellor) should look to some other factors like intelligence, aptitudes and personality; socio-economic-status, family background etc.

PRECAUTIONS

It should always be kept in mind that the record of a student's interest is one such data which should be interpreted along with his scholastic attainments and other psychological and sociological data like his intelligence, aptitude and personality variables such as dominance, submission, sociability, persistance and introversion-extroversion etc. Interest patterns should not be interpreted in isolation and no student should be counselled to take to any vocational activity on the basis of his interest alone.

It should be remembered that scholastic attainments of the students play no less an important role in vocational choices of a student. A student wishing to enter engineering profession, wanting to become a doctor, lawyer or an administrator has to have high academic standards without which he will not be able to enter the profession, even though he may have 'high interest' patterns in allied areas.

The sociological data about a student like the family background, the social status and the financial resources of the family or the financial help that he is likely to get also play an important role in his vocational choice. These various types of socio-psychological data should be collected before a student is helped to make his vocational choice. Entry into a good many professions like medicine, engineering and law need many years of training, a preparation that cannot be taken up by a student with weak financial background. Governmental financial support or scholarships are not available to all students otherwise suitable for entry into such profession.

APPENDIX

INTERESTS, SCHOLASTIC ACHIEVEMENT AND OCCUPATIONAL SUCCESS

INTEREST AND MOTIVATION

Regarding the role of interest in determining the educational achievement of students, Strong has rightly observed in his monumental work 'Vocational Interests of Men and Women' :

'If a student has sufficient interest to elect a course, his grades will depend far more on his intelligence, industry and previous preparation than on his interest. Interest affects the situation, however, in causing the student to elect what he is interested in and not to elect courses in which he is not interested'.

Thus success in any school subject or any vocational field does not depend on any one single variable like interest, intelligence, industriousness or any other personality quality, but on all of them taken together. Every variable given over here or that can be located has something to contribute to the student's final success in his field of endeavour. That is why the correlations reported by different investigators between interest and school subjects, as we shall examine below, are not very high. They are positive no doubt but not of high magnitude. It has been found that interest is related to motivation and motivation plays a significant role in determining the educational and vocational success of a student. Thus, interest in letting the student take the direction in which his motivation lies, affects the final educational or vocational success of a student.

INTERESTS AND SCHOLASTIC SUCCESS

Super has reviewed a number of studies which examine the relationship between interest and scholastic or vocational success of an individual. Majority of these studies have employed Strong Vocational Interest Blank. Findings of some of these studies are reported below.

Townsand ascertained the relationship between the scores on different scales of SVIB and achievement in different school subjects. He could find that they were few and significant only in case of Science Teacher Scale and marks in Chemistry (r = .36); Accountant scale and marks in Commerce (r = .49); and Mathematician Scale and marks in Geometry (r = .31). Townsand could not find significant correlation between Social Science Teacher Scale and marks in History; and Author Journalist Scale and marks in English. Thus, positive and significant correlations have been found to exist only in relevent Strong's Interest scales and achievement in related school subjects.

Similar studies have been carried out with Kuder Preference Record — Vocational and the relationship between interest scores and academic achievement examined. Significant and positive correlations have been reported at least in case of ten such studies. **Triggs** found correlations of (a) .32 between 'scientific' interest and 'general science' achievement; (b) .40 between 'literary' interest and achievement in 'English Literature'; (c) .34 between 'computational' interests and 'Mathematicas' scores. Yum found significant relationships between the 'literary' interests and 'grades' of secondary school students, (r = .35), between the 'computational' interests and 'average' grades (r = .295). Many other investigators have also reported similar results. However a significant point to be noted is **that positive correlations exist only between allied interest factors of Kuder and school subjects.**

INTERESTS AND COMPLETION OF TRAINING

Completion of training is another criterion of educational achievement used by some researchers. If a student has interest in a specific course, he will stay in for training and complete the educational course. If a student lacks such interests but has somehow entered the training institution, he will leave the training course and drop out without completing it. In a study of dental students, completing their dental training course, Strong found that only 25 per cent of dental students who were rated C on his 'dentist' scale graduated in about four to six years, whereas 91% of those who were rated A, 83% of those who were rated B+ and 67% each of those who rated B and B–graduated in prescribed duration. Thus, it is only those who had high or significant interest in dental training could successfully complete the course in normal period. The follow-up data reported by Berdie on scales of SVIB further goes to support this point. Berdie located the 12th grade SVIB record of students who had completed professional training at the University of Minnesota. The following table gives the interest scores of all the four types of students completing the four different types of training on the four different scales of Strong.

Table (*i*) : SVIB Scores and Vocational Training

High Interest	***Completed training in***			
	Medicine	***Law***	***Accountancy***	***Mechanical Engineering***
Physician	49	2	6	21
Lawyer	18	50	18	2
Accountant	5	19	43	6
Engineer	33	0	15	73

A student, as the above table shows, having high interest on 'Physician' scale successfully completes 'Medical' course. This applies also to Law, Accountancy and Mechanical Engineering students. Thus, interest scores have been found to predict sucess in vocational training.

For confirmation of the Strong's hypothesis regarding continuing in rather than leaving field of endeaver, Frandsen correlated the scores on Kuder Vocational Preference Record Scientific and Social Service scales with grades in scientific and social studies courses. Frandsen reported the following inter-correlations between interest scores and the two school subjects.

Table (*ii*) : KVPR Scores and Scholastic Grades

Kuder Interest Scale	*Natural Science*	*Social Studies*
Scientific	.54	– .35
Social Science	– .17	.32

Out of four correlations only two are positive and that too between **allied** interest scales and school subjects.

INTERESTS AND VOCATIONAL SUCCESS

Interest and satisfaction are highly related. The outcome of persuing one's own interests in one's life time is a satisfied life. The psychologists and counsellers alike have been greatly concerned in measuring a worker's satisfaction. But the job satisfaction is a difficult thing to assess. Psychologists have suggested continuity with one's job as the criterion of job satisfaction. Those workers who are satisfied with their jobs continue with it while others change over to other jobs. Strong, too, have favoured stability in one's job as the criterion of satisfaction with the job. Thus, interest inventories can be employed to selected workers who will stay in their jobs.

Strong has employed the criterion of occupational stability as an indicator of occupational satisfaction. It has been contended that interest determines the direction. While ability determines the level of achievement. When a worker is satisfied, he stays in his job or employment otherwise he leaves it and goes over to another. Strong through his five and ten year follow-up work has been able to determine the stability in occupation of workers. His ten year follow-up consisted of 297 standard University seniors, tested in 1927. Of these 197 were retested again in 1932. and 1937. The nine year follow-up was based on 306 Stanford freshmen tested in 1930, of whom 174 were retested in 1939. His main findings were :

1. Man continuing in an occupation 5 or 10 years after college made higher scores in that occupation than in any other occupation.
2. They made higher scores in that occupation than did those who changed from that occupation to some other.
3. This shows that those who made higher score on SVIB were satisfied in that occpation and also stayed there.

Thus, he was able to relate interest test scores with occupational success.

McCully undertook a study to validate the scores on Kuder Preference Record. He followed up a group of men who had been given KVPR at the end of world War II. They were located several years later and their occupations determined. The following table shows the average standard score on each of the nine interest areas of Kuder : —

Table (*iii*) : Mean Kuder Standard Scores of Different Occupation Groups

Interest Factors	*Occupational Groups*				
	Accountancy	*Engineering*	*Managerial*	*Sales*	*Clerical*
1. Mechanical	**– 78**	**58**	–28	**– 65**	– 27
2. Computational	**152**	45	44	– 14	– 67
3. Scientific	– 32	**82**	– 18	– 40	– 9
4. Persuaiance	37	– 16	**56**	**111**	– 9
5. Artistic	**– 82**	07	– 27	**– 54**	– 50
6. Literary	19	01	19	98	4
7. Musical	02	– 21	– 15	17	3
8. Social Service	– 14	– 46	– 02	18	– 14
9. Clerical	**118**	– 41	42	30	**68**

(Based on Mean of 0 and S.D. 100 for reference group of 2797 employed veterans. Means greater than .50 have been indicated in thick bold letters.)

The results show clear cut and fairly substantial differences in patterns of interest for different occupations. Thus, evidence with respect to both the SVIB and the KVPR indicates that they have a certain amount of validity as predictors of occupational choice.

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